Symons's
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WEATHER IN THE SEVENTEENTH CENTURY
(LAST QUARTER).

By Walter Sedgwick.

II.—Harvest and Autumn.

In this article further extracts are given from the Diary kept by the Rev. Wm. Sampson, Rector of Clayworth, Notts., during the last quarter of the Seventeenth Century. In Part I. of this series (see this Magazine for August, 1914), information was given about Mr. Sampson and his "Rector's Book," from which the extracts are taken, and also about the situation of Clayworth, where he lived. It might have been added that Mr. Sampson was President of Pembroke College, Cambridge, from 1672 till 1675, and was elected in 1692 to the more responsible Office of Master of the College, which Office, however, he declined. These facts show that the Rector was a man of considerable standing.

Part I. of the series dealt with the Weather during the period of the year April 4th to July 31st N.S. This part covers the months of August, September, and October N.S.

The notes made by Mr. Sampson referring directly to the weather during these three months are very few, but he has entered in his Diary nearly every year some information about the character of the harvest or the dates when it began and ended. Thus he has given indirectly a fair indication of the weather experienced about harvest time during his 25 years' residence at Clayworth. Even as regards the harvests it is impossible always to be positive as to whether they were early or late, short or prolonged, as it is not always clear whether the Rector is referring to harvest generally or to corn harvest only; again, in some years he states the date when harvest began and in others the date when the tything men entered the fields. The actual date of the commencement of harvest is mentioned in seven years, and varies from July 30th, in 1676, to August 17th, in 1701; the average date being August 8th. The date when the tything operations were commenced is also mentioned

in seven years, and varies from August 9th, in 1691, to August 27th, in 1692; the average date being August 18th. It is impossible to state exactly how many days should be allowed between the date of commencement of harvest and the date when the tything men entered the fields, but, if a period of from 10 to 14 days is right, the average date for the commencement of harvest at Clayworth during this quarter of a century would be about August 5th to 7th. The dates at which the harvest ended is mentioned in 14 years and, as might be expected, varies considerably from year to year, ranging from August 31st, in 1684, to October 20th, in 1696; the average date for the end of harvest being about September 22nd. Assuming the average dates for the commencement and ending of harvest mentioned above to be correct, the variations in the time of harvest during the quarter of a century under review, are shewn in the following table :—

Year	1676	1677	1678	1679	1680	1681	1682	1683	1684
Commencement	V.E.	L.	Av.	...	Av.	Av.	L.	E.	E.
End	...	...	V.E.	Av.	Av.	L.	Av.	Av.	V.E.

Year	1690	1691	1692	1693	1695	1696	1698	1699	1700	1701
Commencement	...	V.E.	V.L.	Av.	...	L.	...	Av.	...	V.L.
End	E.	Av.	...	...	V.L.	V.L.	V.L.	E.	L.	Av.

Av. — Average. E. — Early. L. — Late. V. — Very.

It will be noticed that the period covered by the Diary starts with 9 years (1676 to 1684) in which harvests are for most part early, then follow six years when no information is given, then two more years (1690 to 1691) when the harvest was early, and then a sequence of 10 years (1692 to 1701) when the 8 harvests mentioned are all late or very late, with two exceptions. The latest and most prolonged of these harvests was that of 1696. The harvest of 1692 also began very late, in consequence, no doubt, of the extremely wet summer which was experienced that year at Clayworth (see this Magazine for August, 1914), as indeed also in London and over England generally, according to John Evelyn (see this Magazine, Vol. **46** page 110). Evelyn refers also to the unseasonable weather during the summer of 1696, but adds in September that there was "a great harvest after a cold wet summer."

The considerable difference between the average dates for the beginning and end of harvest during the last ten years covered by Mr. Sampson's Diary, as compared with the first ten years, seems to point to a somewhat marked short periodic variation in the general character of the weather in the neighbourhood of Clayworth during the summer months. Apart from the information given by Mr. Sampson about the dates of harvesting, there is little in the extracts at the end of this article which calls for comment. For the most

part Mr. Sampson's notes on the weather during the three months of August, September, October, relate to the frequency of rain in the late Autumn, particularly in October, accompanied, in many years by stormy weather and strong winds. One year, 1694, there was snow in the latter part of October.

NOTE.—In the following extracts the dates both in the margin and text have been corrected to New Style, except in cases under the heading "Seasons." In these cases it has been found more convenient not to alter the language of the Diary, but where possible the corrected dates in New Style are given in brackets.

Dates. New Style.

1676.		Harvest began, July 30th.
1677.		Harvest began, August 13th.
		Seasons.—In harvest fine and dry.
1678.		Barley harvest began, August 8th. Pease harvest ended, September 3rd.
		Seasons.—We had a fair and dry harvest.
1679.		Harvest in, September 23rd.
	October	26. Rains most of the three weeks last past.
1680.		Tything men entered the fields, August 16th; white corn all gotten in, August 31st; Harvest in, September 18th.
		Seasons.—A very wet time about Autumn.
	October	3. A very sickly time.
1681.		Entered the fields for tything, August 16th; Harvest ended, October 2nd.
1682.		Harvest began, August 12th, ended, September 23rd.
		Seasons.—Corn was generally well gotten. A great fitch year, but beans and peas very indifferent.
1683.		Harvest began, August 3rd. ended, September 21st.
1684.		Harvest began, August 1st, ended August 31st.
		Seasons.—The latter end of August, viz., from the 12th (22nd) was rainy.
1685.		*Seasons.*—The harvest was wet, which caused our wheat to sprout.
1688.		*Seasons.*—August 9th (19th) etc., very dry and droughty.
1689.		Tything men entered the fields, August 12th, and we got all in, September 13th.
		Seasons.—In the declension of October fell great rains, which set the waters everywhere much out.
1690.	August	11. Began watery weather after a long drought.
		Harvest in, September 5th.
1691.		Tything men entered the white corn field, August 9th.
	September	16. Just when harvest was in fell rains again.
1692.		*Seasons.*—In August from 7th to 25th (August 17th to September 4th) the ways were so sobbed that it cost 15s. to make the way . . . . . passable.
		Tything men entered the fields, August 27th; all the wheat was in by the end of August.

	September	18 An earthquake not took notice of here, but felt in divers parts of England; in London about 12 o'clock. It lasted not above one minute.
	October	30. Rains set in apace.
1693.		Tything men entered the fields, August 17th, and finished not white corn until the end of the month (September 10th). *Seasons.*—August, rains delay our harvest.
1694.	August	16th, windy and rainy; 30th, the rains slacken harvest.
	September	15th and 16th, the winds throw down much fruit; 29th, rains after drought.
	October	6th and 7th, strong winds again which throw down much more fruit, yet a great apple year after all; 19th, Rains after drought; 23rd, snow and sharp wind; 27th, a great wind; 30th and 31st, and November 1st, snowy.
1695.	September	5th, it continued raining from the 24th August to this day; 12th, rain with a fierce wind the night following did much hurt to fruit and at sea; 18th, it rained all day. White corn all in at Wyeston, September 17th, and at Clayworth, September 22nd. Pease harvest not all in till October 14th.
	October	31st, misty and foggy.
1696.		Tything men entered the fields, August 25th, and took not their farewell of them till the 20th October following. A general scarcity of fruit this year by reason of a great blast in the Spring.
	August	29th, rain all day.
	September	6th, rain most of the day; 7th, wet still hinders harvest; 18th, rains interrupt harvest; 29th, harvest still halts through lowering weather to the 10th October.
	October	20th, harvest at last ended; 31st, stormy, winds and rain.
1697.		*Seasons.*—In September and October abundance (of fruit) thrown down.
1698.		*Seasons.*—July 30th (August 9th), wind and storm; August, rains obstruct and retard harvest; September, rainy and windy; October, dropping weather most of this month. White corn not in till October 4th. Pease inned about middle of October.
1699.		Tything men entered the fields August, 17th; upon the 30th white corn was all got in and on September 8th, pease also. *Seasons.*—August begins dropping, but after, good harvest weather; September, towards later end high winds throw down fruit; October, drought to the 12th (22nd) after that fell rain to the end of the month.
1700.	August	5th and 10th, rains.
	September	3rd and 8th, rainy; 20th, showery; 28th, rains retard harvest.
	October	8th, much rain in the night; 15th, we got fruit lest the winds do it for us; 26th and 27th, sore rainy days.

1701. August 13th, great shower, afternoon; 17th, thunder, lightning, and rain; 19th, watery weather; 21st, showery and windy; 28th, good harvest day; 31st, very hot.
September 9th, a furious wind.
October 1st, very rainy after a month's drought; 4th, rain all morning; 7th, rain sends labourers out of the field; 14th, furious wind with rain and hail from south-west.
Harvest began, August 17th, and ended, September 22nd.
Fruit first blasted and what was not so, eaten with worms in the Spring, and what was left of both, in the Autumn generally thrown down with winds.

INTERNATIONAL BALLOON ASCENTS.

By W. H. DINES, F.R.S.

October 5th, 1911.

Starting Point.	Country.	A (H_c) miles.	B (T_c) ° F.	C miles.	D ° F.	E miles.	F
Pyrton Hill.....	England ..	6·3	—58	11·6	—61	85	S.W.
Brussels	Belgium ..	5·4	—52	12·4	—62	26	W.N.W.
Hamburg.....	Germany..	5·5	—57	6·3	—58	12	N.W.
Lindenberg.....	,,	6·4	—63	7·4	—64	23	N.E.
Paris.....	France....	7·5	—59	9·2	—67	17	N.W.
Munich	Germany..	7·0?	—63	7·4	—66	81	N.E.
Vienna.....	Austria ..	6·4	—78	7·2	—71	63	E.N.E.
Pavia	Italy	7·7	—74	11·9	—70	86	NE.
Nizhni Olchedaeff	Russia	7·3	—66	7·9	—72	76	E. by N.
Ekaterinburg....	Siberia....	...	...	7·4	—72	78	E.S.E.

A Height in miles of commencement of isothermal column.
B Temperature, F°., at bottom of column.
C Greatest height of reliable record in miles.
D Temperature, F°., at greatest height.
E Distance in miles of point where balloon fell.
F Bearing of falling point from starting point.

An extensive depression stretched from France to N.E. Europe with local minima over the west of France and the Mediterranean, with a high-pressure area between England and Iceland.

The value of H is very indefinite at the western stations. The drift of the balloons to the west in the western part and to the north-east in the eastern part of the area is remarkable.

RAINFALL AND YIELD OF WATER.

THE following is an abstract from "Notes on the Relation between Rainfall and Yield," by D. Halton Thomson, M.A. (Cantab.), Assoc.M.Inst.C.E., published in "Engineering," September 4th, 1914 :—

The purpose of this article is to suggest a development of the common method of ascertaining the relation between Rainfall and Yield by plotting the one against the other and by drawing among the points thus obtained a straight line to represent this relation. Experience shows that the points usually distribute themselves in so haphazard a manner that it is difficult to determine the best position for this line. The reasons for the irregularity fall under three heads.

In the first place, apart from actual errors of observation, the rainfall may be derived from the records of only a few gauges, or even one gauge, so placed as not to be fairly representative of the drainage area; or the yield may be calculated from a weir-gauge, the rating of which is open to question. The construction of a reservoir may appreciably affect the natural yield by the introduction of a new factor, namely, evaporation from its water-surface. Allowances rendered necessary by the working of a reservoir, such as draught to supply and overflow, may also be sources of error.

Secondly, only certain of the conditions affecting Rainfall and Yield, such as size and shape of the drainage area, its topography, geology, condition of surface and natural storage capacity, are constant; others, such as time-distribution and intensity of rainfall, temperature, direction and intensity of wind and saturation, are continually changing. But an equation allowing for these factors is not feasible, and for practical purposes a simple straight-line relation is undoubtedly preferable.

The third source of discrepancy lies partly in the fact that the yield lags behind the rainfall; they are therefore not comparable in every respect over one and the same period. The rainfall of any year might be compared with the yield of the year ending later by the amount of the lag. But even if it is possible to determine its numerical value, the problem of correlation is not thereby solved, for a drainage area not only has a retarding, but also an equalising, effect upon its discharge. The flow of a stream consists essentially of a series of freshets following one another at intervals in accordance with the occurrence of the rainfall from which they are derived. The main mass of the flood-wave usually follows quickly on the rainfall, but weeks and months may pass before the whole of the flow due to that fall has drained off. With most streams in temperate countries the tail-end of a freshet is replenished by its successor long before the channel runs dry, so that the discharge

Fig. 1.

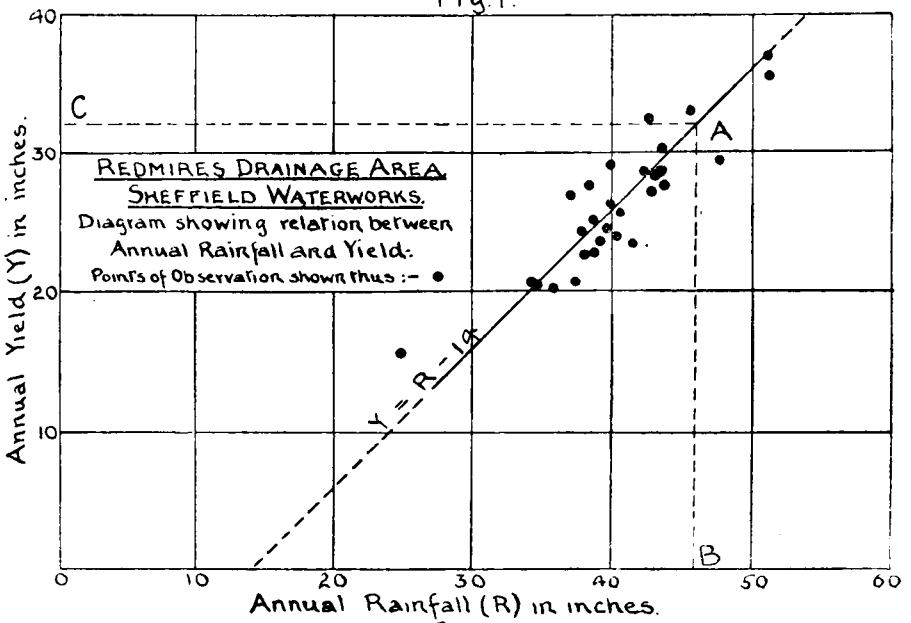
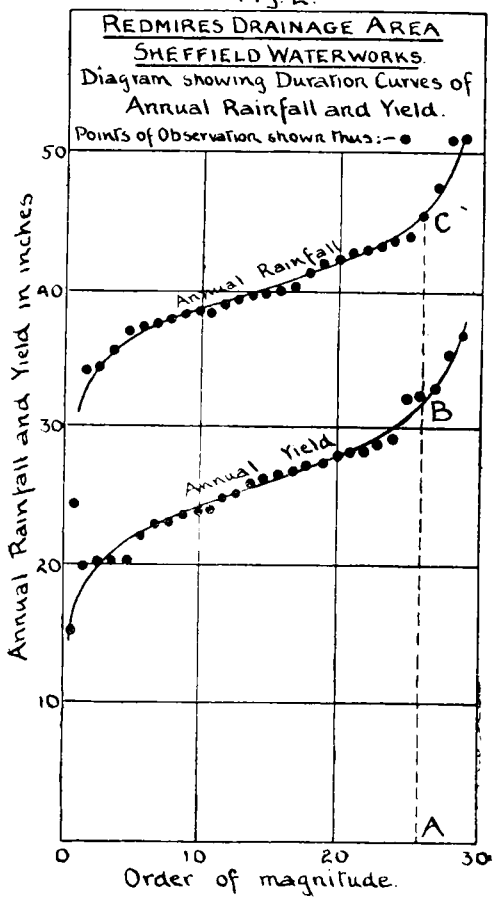


Fig. 2.



D Halrow Thomson

THAMES VALLEY RAINFALL——SEPTEMBER, 1914.

Symons's Meteorological Magazine.

Watershed of River Thames above Teddington, and River Lee above Feildes Weir.

Rainfall Stations reporting.

Isohyetals.

at a given moment may be composed of water originating from a number of entirely independent rain-spells. Moreover, since rainfall varies very considerably from year to year, the surplus yield at the end of a wet year will be greater than at the end of a dry year. Other conditions being unchanged, therefore, the yield of a wet year following a dry year will bear a less than normal proportion to the rainfall, since it will include only a small surplus from that dry year; and, conversely, the yield of a dry year following a wet year will bear a greater than normal proportion to the rainfall, since it will include a large surplus from that wet year.

Some assistance may be gained by regarding the problem from another point of view. Rainfall is a physical phenomenon which varies from year to year, according to some ill-understood law; over a short period these fluctuations appear to be fortuitous, but a long period evinces the fact that those years, the fall in which is in the neighbourhood of the average, occur most frequently, whilst the greater the deviation from the average, both in excess and in defect, the more rare is their recurrence. The longer the periods available, the more marked and regular is this frequency relation. Similarly, the annual yield, since it is derived from the rainfall, varies accordingly to a frequency relation, the form of which, however, will differ from that of the rainfall, since the discharge is equalised by the drainage area and subject to certain losses. If, then, the annual rainfall and yield be taken separately, and the approximate frequency law which a long series of each would ultimately assume be capable of determination, the two phenomena may be correlated on the assumption that the rainfall of a given frequency produces a yield of the same frequency. By this means all considerations of time-lag and difference of time-distribution are eliminated, a simple comparison being made between two events, one of which is known to be derived from the other, and each of which occurs on an average at equal intervals of time. The annual records from 1879 to 1907 of the Redmires drainage area of the Sheffield Water Works are selected as an example. Each yield is plotted in Fig. 1, as a black dot against the rainfall of the corresponding year. The distribution of these dots is markedly irregular. Now, in order to apply the principle of equal frequency enunciated above, the two sets of observations are plotted in order of magnitude in Fig. 2. It is immaterial that the years in each set do not appear in the same order. The horizontal scale then measures the number of years out of the total (in this case 29) during which a rainfall or yield of given magnitude is equalled or exceeded, and smooth curves drawn among the points by freehand, as shown, represent very fairly the frequency relation, were an indefinitely long series of observations available. When more than, say, twenty years' record can be utilised, the points usually lie in a fairly regular manner. The points where any ordinate, such as ABC, cuts the

curves, represent the rainfall and yield occurring on an average with equal frequency. The rainfall AC and the yield AB may, therefore, be transferred to Fig. 1, and used as the co-ordinates of a point on the required straight line. A series of points thus transferred will be found to lie on a straight line, or very nearly so, among the points of observation, and from this a formula for the drainage area can be calculated.

METEOROLOGICAL NEWS AND NOTES.

We have just received from Mr. E. Gold an interesting account of the meteorological proceedings at the British Association meeting in Australia, which we hope to publish next month.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

ARE ENGLISH THUNDERSTORMS MORE DANGEROUS THAN INDIAN?

The above question has been asked in your Magazine for July. I, having travelled all over India, from Cashmere to Point de Galle, and from Karachi to Singapore, occupying a time of several years, embracing some five hot seasons in Meerut and other stations in the Punjab, must have experienced many heavy thunderstorms, particularly at the beginning and ending of the Burra Barsaat (Big Rains) and in all that time never knew or heard of a European or native being killed or struck by lightning, except one by the lightning having gone down through the roof of a bungalow, an iron wire suspending an oil lamp being the conductor. During the small rains (Choto Barsaat), and winter there are sand storms which are mostly accompanied by lightning, but it is mild sheet lightning, and seldom or ever with thunder; when this occurs black and heavy clouds come on and sometimes considerable heat, yet all seems too high in the air, hence no fatalities occur.

I have heard of one or two high buildings being struck, notably the Kootab Minaar, near Delhi (the highest tower in India), but up in the Mountains I have seen tall trees, poplars, pines, deodars, etc., ripped of their bark in strips, by lightning.

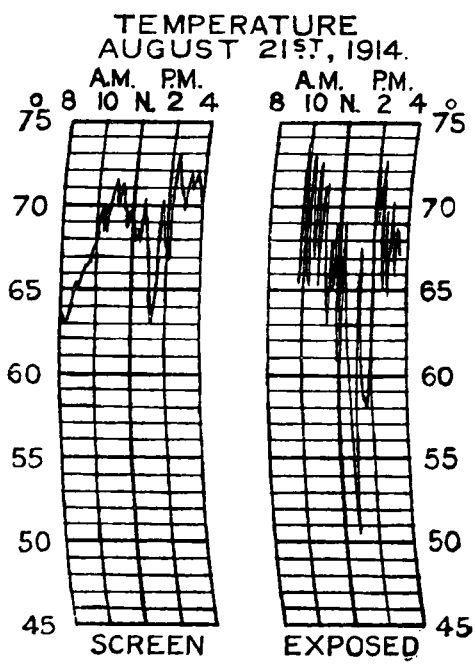
I therefore answer your correspondent's question as for the fact in the affirmative; and for the reason consider it due to the lightning occurring high in the air. I have never seen lightning so low near the earth in the East as I have in England. G.G.

1st September, 1914.

TEMPERATURE DURING PARTIAL SOLAR ECLIPSE.

THE publication in this month's Magazine of the temperature observations made during the recent Eclipse, by Mr. Nowell ffarington, in Lancashire, and by Mr. D. S. Salter, at Camden Square, has suggested to me that possibly your readers might be interested in seeing two thermograph records, reproduced herewith, obtained by me during the continuance of the phenomenon, one of the instruments being in a Stevenson screen, whilst the other was fully exposed in the open air upon a stand two and a half feet above the grass, with the coil projecting beyond the stand and pointing to the south with an absolutely clear exposure all round.

During the eclipse the sky was generally clear, but there were a few detached clouds which occasionally screened the sun, although they were, as a rule, so thin that they only served to enable one to dispense with the usual piece of coloured glass when looking at the sun, and they were generally very transient; just as the eclipse was ending the sky grew overcast and we had a brief thunder shower.



At Norden the maximum fall of temperature due to the eclipse was 3°·9, and at Camden Square it was 2°·2. At Warlingham it was in the screen 7°, and in the open 18°, whilst after the recovery which followed the occurrence of the greatest phase of the eclipse there was a second fall, amounting to nearly 3° in the screen, and to 8° in the open, due to the thunderstorm; and then a rise of 6° and 13°·5 respectively, to the maximum temperature of the day, as recorded in the screen.

The question may reasonably be asked, are these records correct? and in reply I may say that the accuracy of thermographs of this type employed, when properly handled, would probably surprise most meteorologists. In the screen, with the thermograph, I keep a mercurial thermometer by Casella, which I have had in use for more than thirty years and which is tested in ice every year; a maximum by Negretti, and a spirit minimum by Hicks, which are also verified annually; these thermometers are read every day for comparison with the thermograph record, and as regards the ordinary thermo-

meter and the minimum, the agreement is almost invariably well within half a degree. In the case of the maximum the trace reading will, on hot days, generally exceed the standard, sometimes by as much as 3°, but more frequently by 1° or 2°. On the day in question the dry bulb at 9.30 a.m. was 66°, which was exactly the reading of the trace, and on the following morning the maximum for the day of the eclipse read 73°, as against 73°·2 by the trace, and the minimum temperature by both thermometer and trace was 56°.

How, then, can we account for the large oscillation of temperature at Warlingham, as compared with that at the other places? The explanation is simple, and lies in the fact that the coil of the thermograph is far more sensitive to change of temperature than is the bulb of an ordinary mercurial or spirit thermometer, and responds to any change almost instantly, whereas it takes an appreciable time for the mass of mercury in a bulb half an inch in diameter, which is the usual size of thermometer bulbs, fully to do so. It commonly happens that the absolute maximum of the day is reached by very brief bursts of heat, which do not last long enough to allow the thermometer fully to respond to them, although they are sufficient for the thermograph, and thus arises the frequent difference between the two records; whilst, on the other hand, the minimum is generally more gradually reached, and the two instruments march closely together, as they do also in the morning when, as a rule, the temperature does not change too rapidly for the thermometer to keep pace with it. This sensitiveness of the thermograph and relative sluggishness of the thermometer accounts for the comparatively large fall in the thermograph record during the eclipse; and I have not the least doubt that in many cases in which thermometers, not specially constructed with a view to sensitiveness, have been used for measuring quick temperature changes (not necessarily for meteorological purposes) inaccurate results have been obtained owing to their sluggishness; indeed, considering how long it takes for a clinical thermometer with a thin cylindrical bulb in close contact with the body to record, one can see how long it would take when the medium is still air, and when so large a mass of mercury is enclosed in the spherical bulb of a meteorological thermometer.

An experiment I have several times made myself, and seen made by others, has been to mount a thermograph coil upon a piece of wood so that it could be immersed in water, an arm carrying an index point being attached to it so that its indication could easily be read. The coil and a thermometer were then immersed simultaneously in warm (or cold) water, when the arm would record the temperature long before the thermometer was able to overtake it.

I have said these thermographs are accurate when properly handled. The great secret of success in getting good records is delicacy of touch between the pen and the paper. Pressure of any kind is unnecessary and pernicious; the pen must touch the paper

but it cannot do so too lightly; and further the pen must have a fine point—you cannot expect to get a clear trace if you use a pen with a broad point.

All Richard's thermographs were, and probably still are, made with a large bulb of spirit; you must not expect so great sensitiveness from them as from the "Spring" form of instrument; and finally, whether it be a "Spring" or a "bulb," it must not be enclosed in the case in which the clock is placed, but project well beyond it. The first thing I did with the Spring instrument when first asked to test it, was to have the coil taken out of the clock-case and fixed outside it; in the instruments now made for the Meteorological Office, the case is only large enough to hold the clock, and the coil projects about three inches beyond it. R. H. CURTIS.

Late Superintendent of Instruments, Meteorological Office.

Warlingham, 30th September, 1914.

REVIEW.

Clare Island Survey; Climatology. By W. J. Lyons. Reprinted from Proceedings of the Royal Irish Academy, Dublin, 1914. Size $10\frac{1}{2} \times 7$. Pp. 22, and Plates.

Professor Lyons undertook the climatological part of a complete scientific study of Clare Island, which lies off the coast of Mayo, 3 miles south of Achill Island. He merely claims for his work a place as an appendix to the results of the biological studies which formed the main object of the survey.

He divides the subject into six heads :—1. Wind, based upon 17 years' observations at the Clare Island Lighthouse; 2. Barometric Pressure, derived from the records for 35 years at Blacksod, on the mainland, 20 miles from the Island; 3. Air Temperature, also derived from the Blacksod observations for 35 years, the imperfect record being extended by reference to the records at Ardrossan and Valencia; 4. Humidity, also derived from Blacksod and other stations from the 8 a.m. dry and wet bulb readings; 5. Rainfall, derived mainly from the records at Blacksod and Crossmolina for averages, and for local distribution on records kept on the Island itself between 1910-1912. These included those of a hyetograph which Professor Lyons points out on our authority to be the only record of the kind available for Ireland. It might perhaps have been as well to have indicated that "available" was used in the sense of available for publication in *British Rainfall*, as of course the hourly values of rainfall from self-recording gauges at Armagh and Valencia have long been recorded by the Meteorological Office. 6. The sixth and last heading is Sunshine, but the only record in the north-west of Ireland was that at Markree Castle, which are hardly representative.

RAINFALL TABLE FOR SEPTEMBER, 1914.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	RAINFALL OF MONTH. Aver. 1875—1909. in.	1914. in.
		° ′	° ′			
Camden Square	*London*	51 32	0 8	111	2·00	1·00
Tenterden	*Kent*	51 4	*0 41	190	2·25	·98
Arundel (Patching)	*Sussex*	50 51	0 27	130	2·58	1·77
Fawley (Cadland)	*Hampshire*	50 50	1 22	52	2·60	1·54
Oxford (Magdalen College)	*Oxfordshire*	51 45	1 15	186	1·98	·76
Wellingborough (Croyland Abbey)	*Northampton*	52 18	0 41	174	2·14	...
Shoeburyness	*Essex*	51 31	*0 48	13	1·70	·54
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	2·18	1·17
Geldeston [Beccles]	*Norfolk*	52 27	*1 31	38	2·13	·77
Polapit Tamar [Launceston]	*Devon*	50 40	4 22	315	3·11	3·05
Rousdon [Lyme Regis]	,,	50 41	3 0	516	2·69	2·90
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·39	1·29
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·40	1·05
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	2·35	·71
Boston	*Lincolnshire*	52 58	0 1	11	2·07	·93
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	1·84	·99
Macclesfield	*Cheshire*	53 15	2 7	501	2·92	3·24
Southport (Hesketh Park)	*Lancashire*	53 39	2 59	38	3·09	3·62
Arncliffe Vicarage	*Yorkshire, W.R.*	54 8	2 6	732	4·55	3·08
Wetherby (Ribston Hall)	,, ,,	53 59	1 24	130	2·11	1·30
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	2·05	1·34
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	2·00	2·16
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	11·28	5·12
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	3·61	3·09
Haverfordwest	*Pembroke*	51 48	4 58	90	3·91	2·43
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	3·89	2·74
Llandudno	*Carnarvon*	53 20	3 50	72	2·50	2·60
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	3·34	2·00
Marchmont House	*Berwick*	55 44	2 24	498	2·67	·95
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	4·30	2·62
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	2·99	1·60
Inveraray (Newtown)	*Argyll*	56 14	5 4	17	6·15	5·14
Mull (Quinish)	,,	56 34	6 13	35	5·20	3·79
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	2·34	·81
Braemar	*Aberdeen*	57 0	3 24	1114	2·73	·84
Aberdeen (Cranford)	,,	57 8	2 7	120	2·69	1·19
Cawdor	*Nairn*	57 31	3 57	250	2·55	1·49
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	3·54	2·19
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	7·28	6·70
Dunrobin Castle	*Sutherland*	57 59	3 56	14	2·51	1·80
Wick	*Caithness*	58 26	3 6	77	2·57	2·32
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	3·79	4·12
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	3·19	1·59
Nenagh (Castle Lough)	*Tipperary*	52 54	8 24	120	3·16	2·29
Ennistymon House	*Clare*	52 57	9 18	37	4·22	...
Gorey (Courtown House)	*Wexford*	52 40	6 13	80	2·78	1·68
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	2·93	2·09
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	2·06	1·36
Mullingar (Belvedere)	*Westmeath*	53 29	7 22	367	3·02	2·16
Crossmolina (Enniscoe)	*Mayo*	54 4	9 16	74	4·42	3·63
Cong (The Glebe)	,,	53 33	9 16	112	4·05	2·92
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	3·65	2·57
Seaforde	*Down*	54 19	5 50	180	3·25	1·18
Bushmills (Dundarave)	*Antrim*	55 12	6 30	162	3·49	2·27
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	3·39	2·11

RAINFALL TABLE FOR SEPTEMBER, 1914—*continued.*

RAINFALL OF MONTH (*con.*)					RAINFALL FROM JAN. 1.					
Diff. from Av. in.	% of Av.	Max. in 24 hours. in.	Max. in 24 hours. Date.	No. of Days	Aver. 1875—1909. in.	1914. in.	Diff. from Aver. in.	% of Av.	Mean Annual 1875-1909. in.	STATION
—1·00	50	·18	12, 20	9	17·92	14·63	—3·29	82	25·11	Camden Square
—1·27	44	·29	12	6	18·32	17·39	— ·93	95	27·64	Tenterden
— ·81	69	·64	12	8	20·02	19·31	— ·71	96	30·48	Patching
—1·06	59	·43	12	9	21·18	21·81	+ ·63	103	31·87	Cadland
—1·22	38	·28	10	6	17·45	16·43	—1·02	94	24·58	Oxford
...	...	...	...	...	18·20	...	..	...	25·17	Croyland Abbey
—1·16	32	·18	13	11	13·17	11·38	—1·79	86	19·28	Shoeburyness
—1·01	54	·47	12	7	18·14	15·78	—2·36	87	25·40	Westley
—1·36	36	·25	12	11	16·33	13·70	—2·63	84	23·73	Geldeston
— ·06	98	1·17	9	15	24·90	30·71	+5·81	123	38·27	Polapit Tamar
+ ·21	108	1·12	9	9	22·54	27·35	+4·81	121	33·54	Rousdon
—1·10	54	·28	12, 15	7	21·12	19·54	—1·58	93	29·81	Stroud
—1·35	44	·37	12	9	22·71	21·43	—1·28	94	32·41	Wolstaston
—1·64	30	·20	12	8	20·51	14·16	—6·35	69	28·98	Coventry
—1·14	45	·20	12	8	16·67	13·19	—3·48	79	23·35	Boston
— ·85	54	·39	8	8	17·54	12·76	—4·78	73	24·46	Hodsock Priory
+ ·32	111	1·05	12	11	24·85	27·38	+2·53	110	34·73	Macclesfield
+ ·53	117	1·36	16	12	22·70	20·99	—1·71	92	32·70	Southport
—1·47	68	1·24	16	11	42·14	38·02	—4·12	90	61·49	Arncliffe
— ·81	62	·55	17	4	19·08	16·86	—2·22	88	26·87	Ribston Hall
— ·71	65	·36	17	9	18·57	15·48	—3·09	83	26·42	Hull
+ ·16	108	·65	16	11	19·65	18·10	—1·55	92	27·94	Newcastle
—6·16	45	·80	12, 13	15	88·04	84·09	—3·95	96	129·48	Seathwaite
— ·52	86	·95	13	12	28·63	34·10	+5·47	119	42·28	Cardiff
—1·48	62	·70	10	9	30·96	33·16	+2·20	107	46·81	Haverfordwest
—1·15	70	·64	12	12	30·92	33·22	+2·28	107	45·46	Gogerddan
+ ·10	104	1·09	16	10	20·55	19·62	— ·93	95	30·36	Llandudno
—1·34	60	·73	16	12	29·83	30·58	+ ·75	103	43·47	Cargen
—1·72	36	·28	16	10	23·89	17·20	—6·69	72	33·76	Marchmont
—1·68	61	·70	13	12	33·67	35·87	+2·20	107	49·77	Girvan
—1·39	53	·52	15	12	25·03	22·66	—2·37	91	35·97	Glasgow
—1·01	84	·79	23	18	46·21	49·26	+3·05	107	68·67	Inveraray
—1·41	73	·95	16	18	37·87	36·97	— ·90	98	56·57	Quinish
—1·53	35	·42	17	5	20·54	16·49	—4·05	80	28·64	Dundee
—1·89	31	·18	19	12	24·16	21·71	—2·45	90	34·93	Braemar
—1·50	44	·23	23	8	22·78	17·88	—4·90	79	32·73	Aberdeen
—1·06	58	·49	23	5	21·25	18·51	—2·74	87	29·33	Cawdor
—1·35	62	·40	14	18	30·26	26·07	—4·19	86	44·53	Fort Augustus
— ·58	92	1·05	14	16	56·79	66·40	+9·61	117	83·93	Bendamph
— ·71	72	·61	14	7	22·41	21·13	—1·28	94	31·90	Dunrobin Castle
— ·25	90	·71	14	21	20·68	19·42	—1·26	94	29·88	Wick
+ ·33	109	1·05	16	17	36·76	43·94	+7·18	119	54·81	Killarney
—1·60	50	·77	16	5	27·45	25·87	—1·58	94	39·57	Waterford
— ·87	72	·54	7	12	27·73	27·76	+ ·03	100	39·43	Castle Lough
...	...	...	...	...	32·47	...	...	...	46·52	Ennistymon
—1·10	60	1·04	16	7	24·41	22·70	—1·71	93	34·99	Courtown Ho.
— ·84	71	·90	16	12	25·70	25·86	+ ·16	101	35·92	Abbey Leix
— ·70	66	·75	16	9	19·89	15·82	—4·07	80	27·68	Dublin
— ·86	71	·45	8, 16	13	26·19	26·58	+ ·39	101	36·15	Mullingar
— ·79	82	·67	22	18	35·74	36·59	+ ·85	102	52·87	Enniscoe
—1·13	72	·53	22	13	33·88	36·31	+2·43	107	48·90	Cong
—1·08	70	·50	23	17	30·14	32·63	+2·49	108	42·71	Markree
—2·07	36	·23	12	10	27·63	22·81	—4·82	83	38·91	Seaforde
—1·22	65	·55	10	12	26·32	23·77	—2·55	90	37·56	Dundarave
—1·28	62	·42	12	14	28·05	27·40	— ·65	98	39·38	Omagh

SUPPLEMENTARY RAINFALL, SEPTEMBER, 1914.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road .	·93	XI.	Lligwy	3·02
,,	Ramsgate	·52	,,	Douglas	2·00
,,	Hailsham	1·49	XII.	Stoneykirk, Ardwell House...	1·19
,,	Totland Bay, Aston House...	1·27	,,	Dalry, The Old Garroch	...
,,	Stockbridge, Ashley	1·04	,,	Beattock, Kinnelhead	1·96
,,	Grayshott	1·61	,,	Langholm, Drove Road	2·63
III.	Harrow Weald, Hill House...	1·02	XIII.	Meggat Water, Cramilt Lodge	2·18
,,	Caversham, Rectory Road ...	·86	,,	North Berwick Reservoir	·51
,,	Pitsford, Sedgebrook...	1·02	,,	Edinburgh, Royal Observaty.	·57
,,	Woburn, Milton Bryant.	1·09	XIV.	Maybole, Knockdon Farm ...	2·35
,,	Chatteris, The Priory	1·01	XV.	Ballachulish House	5·98
IV.	Elsenham, Gaunts End	1·05	,,	Campbeltown, Witchburn ..	3·64
,,	Colchester, Hill Ho., Lexden	1·09	,,	Holy Loch, Ardnadam	4·51
,,	Ipswich, Rookwood, Copdock	1·14	,,	Islay, Eallabus	3·40
,,	Blakeney	·46	,,	Tiree, Cornaigmore	3·55
,,	Swaffham	·90	XVI.	Dollar Academy	1·42
V.	Bishops Cannings	1·41	,,	Balquhidder, Stronvar	2·70
,,	Wimborne, St. John's Hill ...	1·99	,,	Glenlyon, Meggernie Castle..	2·40
,,	Ashburton, Druid House	2·95	,,	Blair Atholl	1·13
,,	Cullompton	2·32	,,	Coupar Angus	·64
,,	Lynmouth, Rock House	3·02	,,	Montrose, Sunnyside Asylum.	·81
,,	Okehampton, Oaklands...	2·99	XVII.	Alford, Lynturk Manse	1·33
,,	Hartland Abbey	2·32	,,	Fyvie Castle	2·06
,,	Probus, Lamellyn	2·43	,,	Keith Station	2·49
,,	North Cadbury Rectory.	2·16	XVIII.	Rothiemurchus	1·31
VI.	Clifton, Pembroke Road....	1·63	,,	Loch Quoich, Loan	12·50
,,	Ross, The Graig	1·08	,,	Drumnadrochit	1·35
,,	Shifnal, Hatton Grange.	1·47	,,	Skye, Dunvegan	8·06
,,	Droitwich	·98	,,	Lochmaddy, Bayhead	4·59
,,	Blockley, Upton Wold	1·37	,,	Glencarron Lodge	8·03
VII.	Market Overton	·50	XIX.	Invershin	2·44
,,	Market Rasen	·71	,,	Melvich	3·97
,,	Bawtry, Hesley Hall	·70	,,	Loch Stack, Ardchullin	9·17
,,	Derby, Midland Railway	·97	XX.	Skibbereen Rectory	3·86
,,	Buxton	4·14	,,	Dunmanway, The Rectory ..	4·23
VIII.	Nantwich, Dorfold Hall	2·06	,,	Glanmire, Lota Lodge	2·84
,,	Chatburn, Middlewood	3·89	,,	Mitchelstown Castle	3·52
,,	Cartmel, Flookburgh	...	,,	Darrynane Abbey	4·58
IX.	Langsett Moor, Up. Midhope	2·67	,,	Clonmel, Bruce Villa	3·28
,,	Scarborough, Scalby	1·74	,,	Newmarket-on-Fergus, Fenloe	4·39
,,	Ingleby Greenhow	1·96	XXI.	Laragh, Glendalough	2·49
,,	Mickleton	2·10	,,	Ballycumber, Moorock Lodge	1·42
X.	Bellingham, High Green Manor	1·22	,,	Balbriggan, Ardgillan	1·07
,,	Ilderton, Lilburn Cottage ...	1·14	XXII.	Woodlawn	2·43
,,	Keswick, The Bank	2·40	,,	Westport, St. Helens	2·64
XI.	Llanfrechfa Grange	2·09	,,	Dugort, Slievemore Hotel ..	3·73
,,	Treherbert, Tyn-y-waun	4·32	,,	Mohill Rectory	1·51
,,	Carmarthen, The Friary	2·27	XXIII.	Enniskillen, Portora	1·94
,,	Castle Malgwyn [Llechryd]...	..	,,	Dartrey [Cootehill]	1·73
,,	Crickhowell, Tal-y-maes	3·00	,,	Warrenpoint, Manor House ..	1·28
,,	New Radnor, Ednol	2·05	,,	Banbridge, Milltown	1·21
,,	Birmingham WW., Tyrmynydd	2·67	,,	Belfast, Cave Hill Road	1·71
,,	Lake Vyrnwy	...	,,	Glenarm Castle	...
,,	Llangyhanfal, Plâs Draw	2·75	,,	Londonderry, Creggan Res...	2·86
,,	Dolgelly, Bryntirion	3·47	,,	Dunfanaghy, Horn Head ...	2·26
,,	Bettws-y-Coed, Tyn-y-bryn...	3·26	,,	Killybegs	4·15

THE WEATHER OF SEPTEMBER.

THE anticyclonic conditions which prevailed in the latter days of August continued into September, and light winds with dry weather and an abundance of sunshine were experienced over the United Kingdom generally. Temperature remained well above the average, and 81° or 82° was reached at many stations in the Midlands and the south and east of England on the 3rd. A depression which advanced from the Bay of Biscay, in a north-easterly direction, caused thunderstorms at many places in the south-west of England and the south of Ireland, on the 8th and 9th. The heaviest falls, all of which occurred on the 9th, were 2·36 in. at Salcombe Regis, 2·15 in. at Sidmouth, and 1·81 in. at Exeter. At Broadford (Co. Clare), Lieut.-Col. Bentley reports that the thunder began at 1 p.m. in the north-east, when the sky in that direction was as black as ink. Rain began to fall at 3.40 p.m., and stopped at 5.15 p.m., when 1·06 in. had fallen. Four miles to the south there was no rain at all. On the 11th a large depression, accompanied by a secondary, which moved directly across the country, to the coast of Norway, brought the wind into the south-west and west generally. On several exposed parts of the coast gales were reported. In the week following rather large and deep depressions, travelling from west to east, caused rough weather. Severe gales occurred over a wide area on the 14th. At Southport gusts blew at the rate of 90 miles per hour. At Castle Forbes many trees were blown down and the fruit crops suffered much injury. More than 1 inch of rain fell at many stations in the west of England and the south of Ireland, on the 16th, the heaviest falls we have noted being 2·21 in. at St. Annes-on-the-Sea, and 1·66 in. at Sedbergh. Thunderstorms, or thunder only, occurred at some stations in Scotland and the north of England on the 19th. With the exception of a small area in the north of Scotland, where heavy rain fell on the 30th, the last 10 days were practically rainless. At many stations in southern Ireland the dry period lasted from the 17th, and in the midland and south-eastern counties of England, from the 19th. Though generally sunny, the temperature was somewhat low, and frosts occurred in the Midlands and in the east of the Kingdom generally, on the 22nd, 23rd, and 30th. Heavy rain fell in the north of Scotland on the 30th, 2·81 in. being measured at Loch Stack, and 1·12 in. at Melvich.

In London the weather was fine and sunny, with normal temperature and but little rain. None fell in the first 8 or the last 10 days. At Camden Square. the mean temperature was 57°·9 or 0°·2 above the average. The total evaporation was 1·68 in., and the duration of rainfall was 16·3 hours. The duration of sunshine, 176·6 hours, was the greatest for the month in the past 11 years, excepting the brilliant September of 1911. Other sunshine records were : Copdock, 195·9 hours, Totland Bay, 205·5 hours, Sidmouth, 226·1 hours Ashbourne, 178·1 hours, and Loch Stack, 85·5 hours.

The general rainfall over the country, expressed as a percentage of the average, was as follows : England and Wales, 66 ; Scotland, 66 ; Ireland, 69 ; British Isles, 67, the rainfall being thus almost exactly two-thirds of the average for September.

Climatological Table for the British Empire, April, 1914.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain Depth.	Total Rain Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	76·2	21	34·4	26	62·6	41·6	42·3	72	119·3	27·6	·81	9	4·0
Malta	74·5	10	51·2	2	62·4	52·2	...	83	131·0	...	·02	1	1·3
Lagos	92·0	9*	72·0	10	89·8	76·9	74·9	73	154·0	68·0	4·54	9	7·2
Cape Town	86·5	30	43·6	12	70·8	54·3	53·2	72	...	...	1·62	12	5·8
Natal, Durban ...	78·0	1, 8†	53·0	25	72·7	65·0	65·0	80	...	...	6·71	11	5·0
Johannesburg	77·5	10	36·8	25	71·7	52·1	50·8	76	...	33·5	·51	7	3·5
Mauritius	86·3	3	62·9	6	82·7	69·9	69·1	80	...	57·6	2·84	17	5·5
Bloemfontein	83·0	21	31·0	25	73·4	49·0	46·6	65	...	...	1·44	4	2·7
Calcutta...	97·1	2	64·3	29	92·9	73·4	70·1	69	...	63·0	3·22	8	4·4
Bombay...	91·3	30	73·3	10	88·0	76·3	72·9	75	133·6	65·4	·07	1	1·5
Madras	95·8	1	71·6	2	90·8	76·8	75·1	79	163·7	70·5	2·05	4	2·8
Colombo, Ceylon ...	92·1	25	71·4	12	90·4	74·9	77·6	78	...	67·0	3·81	15	4·8
Hongkong	87·2	25	55·9	5	76·3	68·0	66·4	83	...	...	4·47	15	8·5
Sydney	84·1	10	53·1	25	75·6	60·8	53·3	63	133·0	41·1	1·53	4	3·8
Melbourne	84·1	9	41·5	15	68·4	51·5	47·6	62	127·4	33·4	1·72	15	5·8
Adelaide	86·9	8	48·9	25	72·3	56·2	51·3	63	141·6	40·2	1·77	14	6·1
Perth	89·0	11	39·3	20	71·0	52·8	51·5	68	144·9	30·9	·75	14	4·4
Coolgardie	91·0	12	36·0	20	76·9	52·0	46·3	48	147·0	32·0	·23	3	2·6
Hobart, Tasmania ..	79·3	9	37·3	11	61·6	47·4	44·5	63	125·4	32·0	3·05	17	7·1
Wellington ...	71·0	5	40·6	24	62·9	52·8	50·0	76	132·6	29·0	2·56	21	6·4
Auckland	72·0	16	46·5	18	66·9	54·5	54·6	81	138·0	42·0	4·21	20	6·3
Jamaica, Kingston ..	90·3	26	68·6	1	87·3	71·4	68·0	70	...	...	·95	6	...
Grenada	89·0	24	70·0	25	84·3	74·1	...	73	136·0	...	2·59	13	3·5
Toronto	67·0	18	21·5	9	48·9	34·1	31·0	72	78·2	18·8	1·92	12	6·1
Fredericton	70·0	19	—5·0	3	46·0	23·1	...	71	...	...	4·09	10	5·6
St. John, N.B. ...	59·8	27	16·0	3, 4	41·7	28·5	27·0	72	...	...	5·32	10	5·5
Edmonton, Alberta ...	72·8	30	8·2	2	54·3	29·1	...	50	127·9	5·5	·31	2	5·1
Victoria, B.C.	64·4	9	35·2	1	57·8	43·2	43·0	76	...	...	1·04	12	5·8

* 13 and 14. † 9 and 11.

Johannesburg.—Bright sunshine 268·6 hours.

Mauritius.—Mean temp. of air 0°·4, dew point 0°·7 above, and R 1·75 in. below, averages. Mean hourly velocity of wind 8·3 miles, or 2·2 below average.

HONGKONG.—Mean temp. of air 71°·5. Mean hourly velocity of wind 12·8 miles. Bright sunshine 114·4 hours.

Melbourne.—Mean temp. of air 0°·4 above, and R ·59 in. below, averages.

Adelaide.—Mean temp. of air 0°·4 above, and R ·08 in. below, averages.

Coolgardie.—Temp. of air 1°·0 below, and R about ·50 in. below, averages.

Hobart.—Mean temp. of air 0°·6 below, and R 1·24 in. above, averages.

Wellington.—Mean temp. of air 1°·0 above, and R 1·46 in. below, averages. Bright sunshine 150·3 hours.

Auckland.—Cloudy and showery, rainfall more than 1 in. above average and temp. slightly below.

ALBERTA, EDMONTON.—A sunny, rather warm and very dry month. Rainfall half the average.